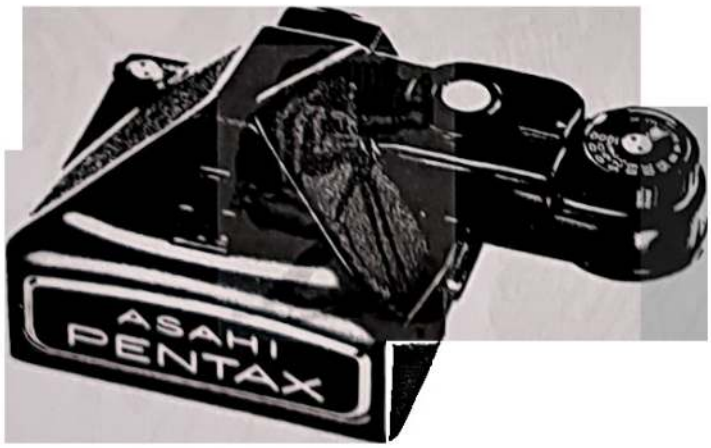
PRODUCT No. 71003

T. T. L PENTA PRISM FINDER

(MODIFIED MODEL)



WIRING — —
ILLUSTRATION

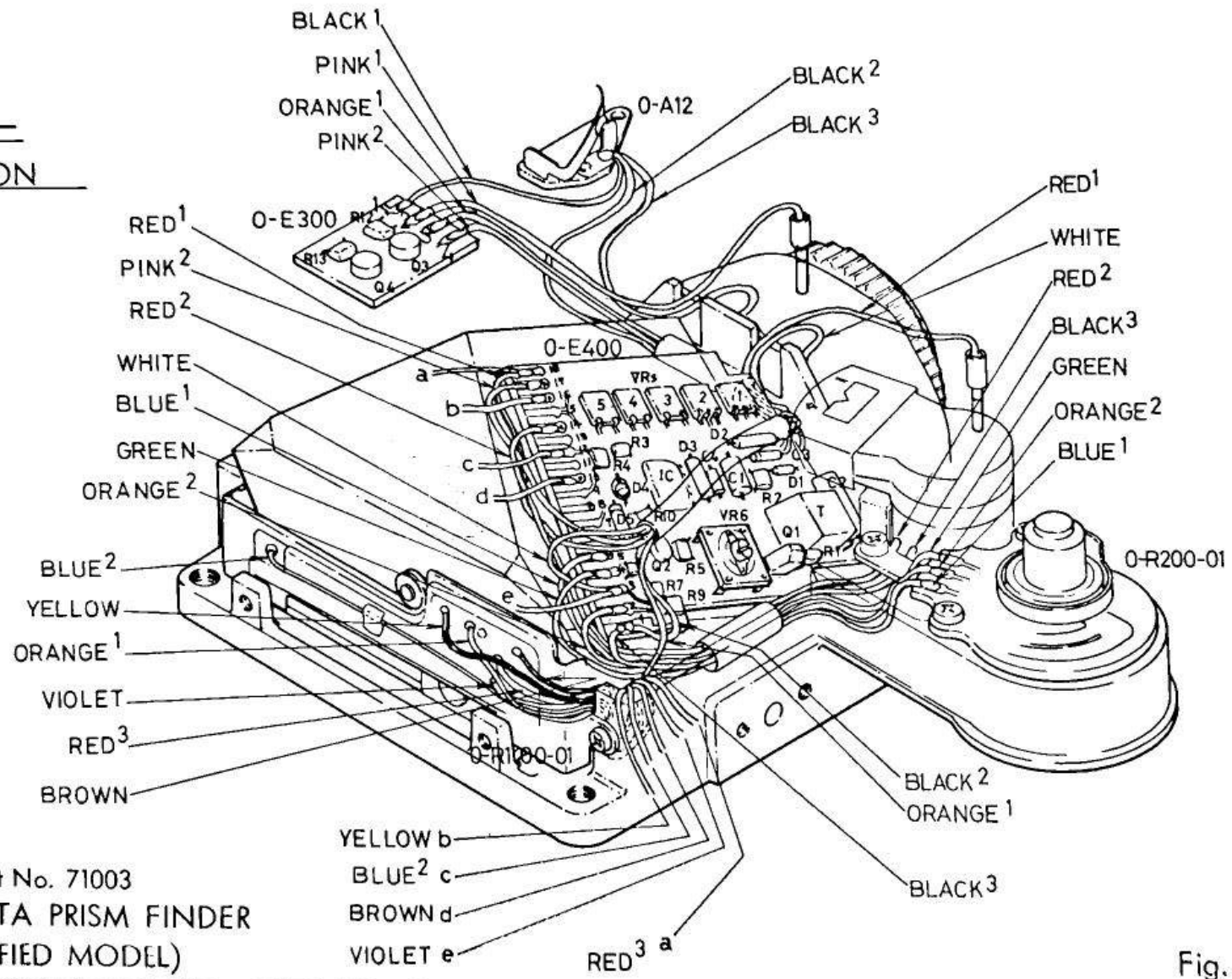


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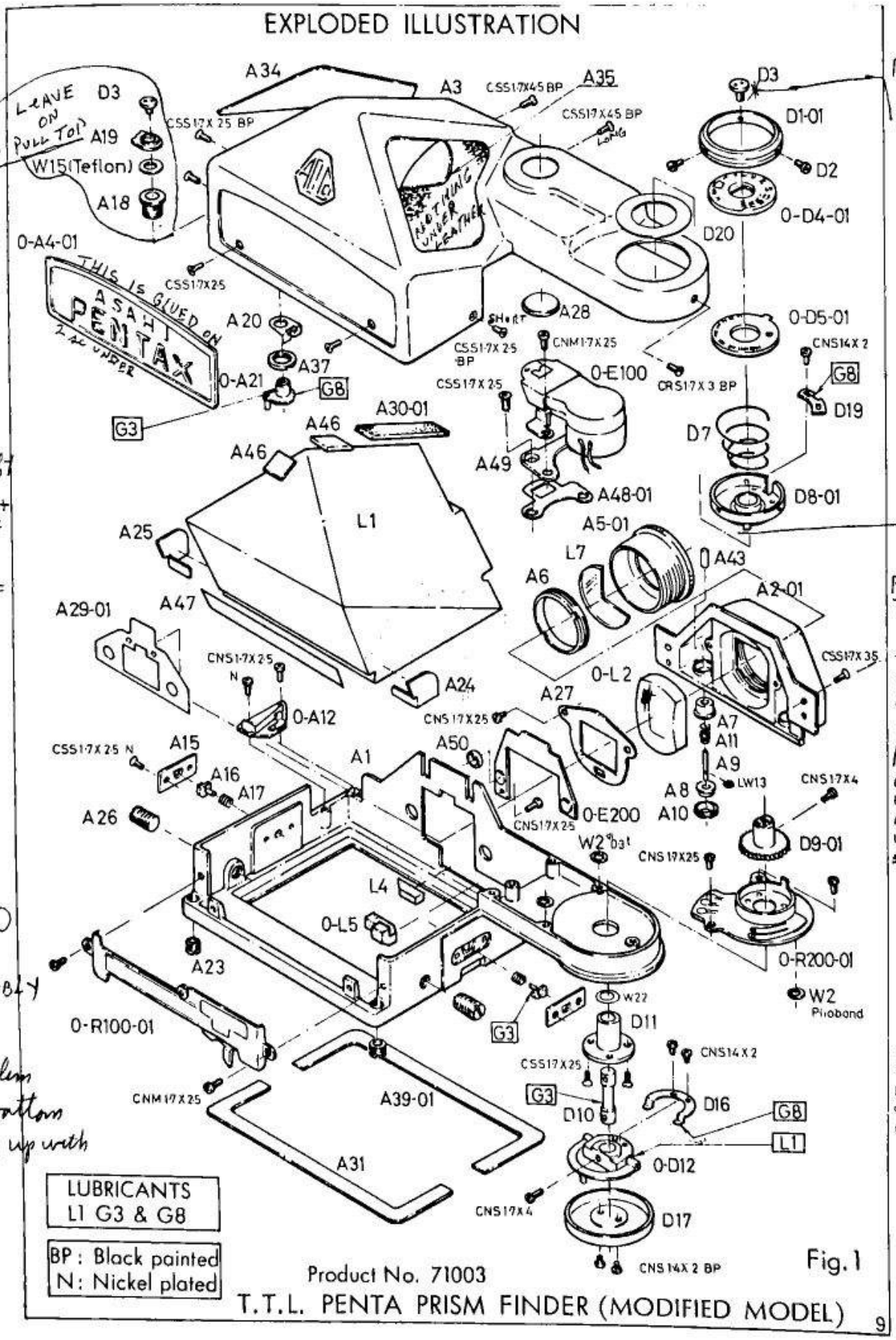
Fig. 2



Remove D FOR COMPLETE ASS'Y

TO PULL TOP 2 sc under name Plate 2 sc on R SIDE 2 sc on Rear one sc on left END + 1 on LEFT SIDE + CENTER SC on SPEED DIAL + LIFT OFF TOP

PULL TOP THEN 2 sc [redacted] TAKE OFF REAR EYE PIECE NOTE one WHITE + ONE RED WIRE SOLDERED ON

USE X on speed dial + ASA20 FOR DISASSEMBLY only for check - NO Problem Mark bottom To line up with PIN.

REFLECTS +& - INDICATOR & IS GLUED ON

71003 SCHEMATIC DIAGRAM

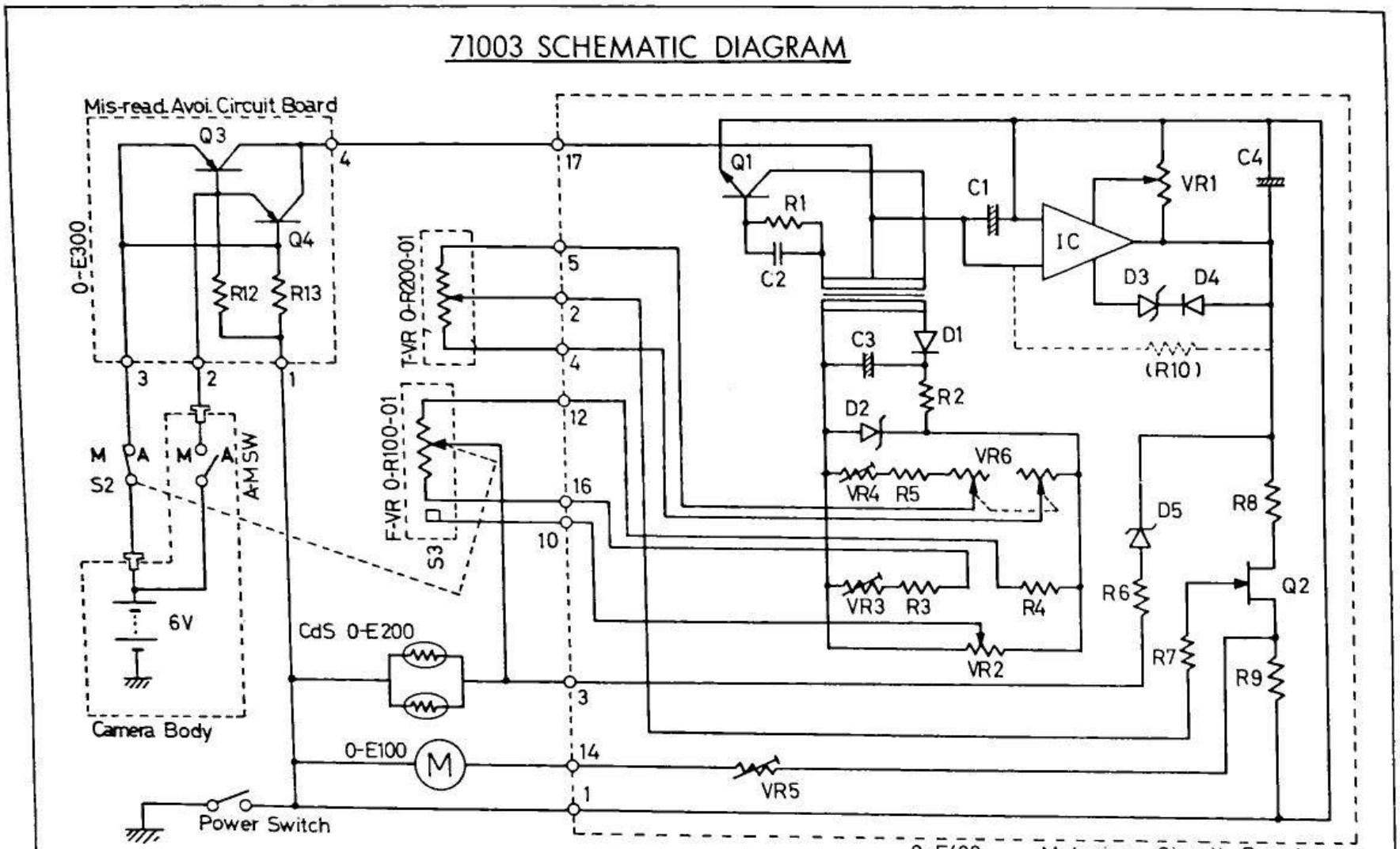


Fig. 3

Product No. 71003

Metering Switches : positioned in Full-Aperture Metering.

T.T.L. PENTA PRISM FINDER (MODIFIED MODEL)

LIST OF SERVICE PARTS

Product No. 71003
T.T.L. PENTA PRISM FINDER (MODIFIED MODEL)

1. The parts with numbers starting "0-" are assembled parts.

Parts No.	Description	Quantity	Interchangeability
A 1	Prism seat (Frame)	1	
A2-01	Eyepiece housing	1	
A3	Top cover	1	
0-A4-01	Nameplate (A4, A44)	1	70034-P4
A5-1	Eyepiece ring	1	70034-P15
A6	Eyepiece lens retainer ring	1	70034-P16
A7	Terminal insulation tube	2	
A8	Terminal insulation collar	2	
A9	Terminal contact	2	
A10	Terminal nut	2	
A11	Terminal spring	2	
0-A12	Main SW seat assembly (A12, A13, A14, A32, A33, A38x3)	1	
A15	Lock pin guide	2	
A16	Lock pin	2	71002-F27
A17	Lock pin Spring	2	
A18	Main SW tube	1	
A19	SW handle	1	
A20	Click spring	1	
0-A21	Click plate assembly (A21, A22, A36)	1	
A23	Viewfinder guide receptacle	2	

Parts No.	Description	Quantity	Interchangeability
A24	Prism protector A	1	70034-P8
A25	Prism protector B	1	70034-P7
A26	Prism retainer screw	2	70034-P10
A27	Lens retainer plate	1	
A28	Meter window	1	
A29-01	Prism protector sheet, rear	1	
A30-01	Prism protector cushion, large	1	70034-P19
A31	Prism cushion A	1	
A34	Covering right	1	
A35	Covering left	1	
A37	Main SW tube nut	1	
A39-01	Prism cushion B	1	
A46	Prism protector cushion, small	2	
A47	Prism protector sheet, front	1	
A48-01	Gate mask	1	
A49	Meter installation plate	1	
A50	CdS collar	1	
D1-01	Shutter dial	1	
D2	Dial installing screw	3	23102-05100
D3	Dial retainer screw	2	
0-D4-01	Dial plate assembly (D4, D18)	1	
0-D5-01	ASA dial assembly (D5, D6, CNS 1.2x1.4)	1	
D7	Dial spring	1	
D8-01	Dividing claw	1	
D9-01	Dividing gear	1	

Parts No.	Description	Quantity	Interchangeability
D10	Dial shaft	1	
D11	Dial shaft receptacle	1	
0-D12	Bottom dial receptacle assembly (D12, D13, D14, D15)	1	
D16	Connector plate spring	1	
D17	Dial bottom cover	1	
D19	T-VR positioner plate	1	
D20	Duster ring	1	
0-E100	Ammeter	1	
0-E200	CdS cell assembly (E2x2, E3)	1	
0-E300	Mis-reading avoidance circuit board	1	
0-E400	Metering circuit board	1	
E21	C. board attaching tape	5	
L1	Pentaprism	1	70034-L1
0-L2	Eyepiece lebs assembly (L2. L3)	1	
L4	11° prism	1	
0-L5	Porlo prism (L5x2, L6)	1	
L7	Protection glass	1	
0-R100-01	F-VR (R101 ~ R103, R106 ~ R118)	1	
0-R200-01	T-VR (R201 ~ R207)	1	

LIST OF STANDARD PARTS

Product No. 71003

T.T.L. PENTA PRISM FINDER (MODIFIED MODEL)

Description	Surface	Position of Use	Quantity
CSS 1.7 x 2.5	Black Nickel	D11, A1	3
	Nickel Plated	A15, A1	4
	Black Painted	A3, A1	5
	Black Nickel	A49, A48, A1	2
CSS 1.7 x 3.5	"	A1, A2	2
CSS 1.7 x 4.5	Black Painted	A3, A2, A1	2
CNS 1.2 x 1.4	Black Nickel	0-D5	1
CNS 1.4 x 2	"	D19, D8	2
	"	D16, D12	2
	Black Painted	D17, D12	2
CNS 1.7 x 2.5	"	A12, A1	1
	"	R200, A1	3
	"	A27, A2	1
	"	E2, A1	1
CNS 1.7 x 2.5	Nickel Plated	A12, A1	1
CNS 1.7 x 4	Black Nickel	D10, D12	1
	"	D9, D10	1
CNM 1.7 x 2.5	"	R100, A1	2
	"	E1, A49	2
CRS 1.7 x 2.0	Black Painted	A3, A1	1

Description	Material	Thickness	Position of Use	Quantity
W2	Phosphor Bronze	0.3mm	R100	3
W15	Teflon	0.2mm	A19	1
W22	Phosphor Bronze	0.1mm	D11	1
LW 13	Steel		A9	2

LIST OF SPECIAL SERVICING TOOLS

Product No. 71003

T.T.L. PENTA PRISM FINDER (MODIFIED MODEL)

Description		Position of Use
23400K-A33-A	6 x 7 cameras	D3
23400K-C95-A	"	A10
Adjustable Spanner AK3-LA		A6

Remark:

No exclusive tools are used with T. T. L. FINDER

TTL PENTA PRISM FINDER (Prod. No. 71003) MANUAL (MODIFIED MODEL)

1 General Description

This TTL Penta Prism Finder for Pentax 6x7 camera operates in full-aperture metering when used with full-aperture metering lenses having a f/stop coupler to the camera body. When used with other lenses not having the coupler or in state where the coupler is inoperative, stop-down metering will be automatically selected upon fitting the lenses. Stop-down metering with a full-aperture metering lens will be enjoyed by ①disengaging f/stop coupling between the TTL and the camera body and ②selecting the lens's preview lever to "Man" position.
Mis-metering will be checked by means of an incorporated mis-reading avoidance circuit (acts like a power switch) which comes "off" when metering mode selector switches are wrongly actuated.
Metering is of Zero-method type with indication needle that trips about 2EV from 0 toward "+" and over 3EV toward "-", and the needle will be invisible when deflected beyond 3EV toward "-". When the power is off, the needle rests at fully tripped position toward "+".
The TTL draws power from Camera's battery and consumes about 4mA for operation, requiring the power switch to be turned off after metering to prolong battery life. The minimum power voltage for normal operation is rated 4.5V or lower. Use camera's battery checker for battery check.

2 Circuit Description

General

Information from CdS resistor cells (so-called "CdS") is *1 log-compressed by D5 to obtain a photographic calculation input of which value varies by a certain value for every 1EV variation of photographing subjects.
Calculation takes place in a kind of a so-called bridge circuit consisting of F-VR, T-VR etc., and the answer (the output of this calculator circuit or the bleeded potential of the potentiometer T-VR) is indicated on an ammeter via. Field Effect Transistor (Q2).
Most electronic components are arranged on the two circuit boards: a metering temperature-compensated ——— and a mis-reading avoidance circuit board. For repair, each should be replaced in a unit; replacement of individual component especially on the metering circuit board is basically prohibited.

Mis-reading avoidance circuit

A power switching circuit consisting of Q3, Q4 etc. to shut off the power when metering switches (shown as S2, S3 and A-M SW in the schematic-diagram) are wrongly selected like when A-M switch is selected "M" while S2 being closed (that is, f/stop couplings are engaged). Thus any false metering is warned by a dead needle.
On normal operation in which either one of A-M switch or S2 is closed, this switching circuit comes "ON" with a voltage drop (voltage loss) less than 0.1V. When both switches are wrongly closed, no forward bias to Q3 and Q4 will be produced, modulating those silicon transistors into high impedances.

Automatic voltage regulator (AVR)

To counteract variation of the power output (BATT), two AVRs are provided: a calculator power source consisting of Q1, T1 etc. and a 4-volt regulator (3.5 ~ 4.5V in the practical circuits) consisting of Hybrid IC, D3, D4 etc..
The calculator AVR is an insulated power source obtained from 130KHz oscillator transformer, and regulated to 6~7V DC by D1 and D2 (Zener type).

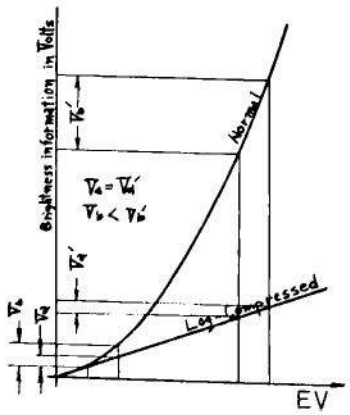
Metering Calculation circuit

*1 Log-compressed CdS's information is fed into the calculator as a log-compression output of which voltage varies by about 100mV per a 1EV variation (called a unit voltage variation against a unit EV variation) of photographing subjects. Under usual brightness, this output level will be around 1V, falling when EV advances, rising when lowers. Note that with advancing EV, the output voltage (samely a calculator output) grows lower resulting in a needle deflection toward "+".

Calculator is a voltage-based calculation bridge, consisting of F-VR at input, T-VR at output, and others. An ultimate high input impedance element, FET follows this high impedance calculator as a impedance buffer to ensure correct metering. Calculator circuit adjustment should be so made by resistors (rheostats) as to allow the potentiometers F-VR and T-VR to produce a unit voltage variation (of about 100mV as given previously) when F-VR or T-VR receives 1EV mechanical movement. As in Pentax SP, shutter speed and film speed are mechanically culculated, the result being reflected on T-VR setting. Others are electronically processed according to *2Apex method.

As found, the calculation is to find an adequate degree of voltage level shift that developes a certain reference gate voltage of the FET under a given photographing condition. A dual rheostat (VR6) is provided to establish meter level.

*1 Logarithmic Compression



Information from CdS resistor cells (impedance variations) varies over wide range since brightness of photographing subjects varies according to the equation $B=K2^{EV}$ Where B is brightness and K is a constant, showing B is proportional to 2^{EV} which varies by powers of EV. By taking advantage of Log-compression, this is coverted into a voltage variation which equally varies against unit EV variation over operating range of from EV19 to EV2.5 (with standard lens and ASA 100 film) or beyond. This enables the circuit to operate with Apex method, significantly reducing its operating dynamic range. Same idea has been employed in Pentax ES.

*2 Apex Method

One of the photographic calculation methods, attained through only addition or subtraction. f/stop, Brightness (EV), film speed and shutter speed being evaluated in each Apex Numbers as Av, Bv, Sv and Tv respectively, a proper exposure is defined in the following equation in the Zero-method.

$$Bv' - Av + Sv - Tv = 0 \text{ (needle's indication)} \text{ -------(1)}$$

In this unit, however, Sv and Tv are mechanically processed. Equation (1) can be re-written as follows:

$$Bv - Av + T'v = 0 \text{ ---------- (2)}$$

3 Notice For Servicing

[A] Parts:

Matching of CdS(0-E200) and Metering Circuit Board (0-E400)

E400 has a color marking of ①Red ②Yellow ③Blue ④White at the spot shown in Fig3-1, and E200 has a digit marking of from 1 to 8,according to their operating charactristics.
E200 and E400 should be used in combination shown in Fig3-1.

Ammeter(0-E100) Installation

Install E100 so that it's metering-reference-gate comes right into the position within the metering image zone as shown in Fig3-2. Gate-Mask (A48) should be so fixed as not to vignette the gate area.

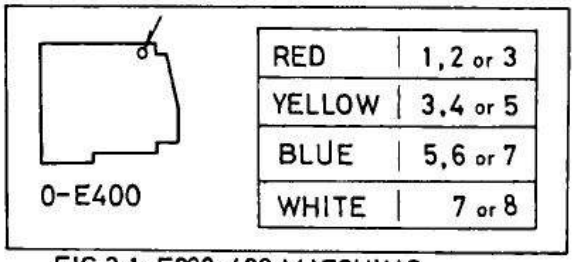


FIG 3-1· E200·400 MATCHING

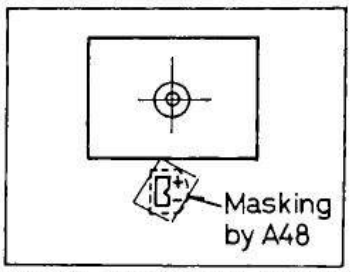


FIG 3-2 METERING-REFERENCE-GATE IMAGE

Replacement of ASA Dial (0-D5-01)

Dial plate position of D5 must be adjusted along with a camera body engaged to secure T-VR operating range of from ASA32:1/1000 down to ASA100:1. Ensure that T-VR's slider contact remains within the resistor area (shown in Fig3-3) when the above margin is set.

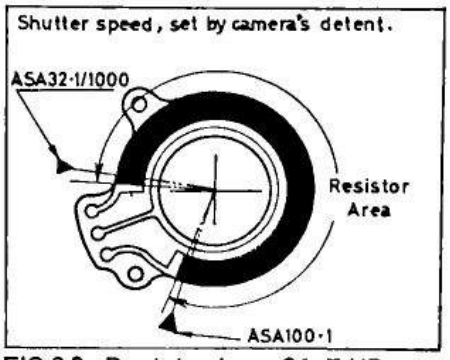


FIG 3-3 Resistor Area Of T-VR

Installation Of Metering Circuit Board
(0-E400)

E400 should be fixed into the position shown in Fig3-4 by use of both-side-surface adhesive tapes in order to maintain proper clearance to Top Cover(A3).

Metering Image Transfer Prisms
(L4, 0-L5)

Cemedine 3000H (adhesive) can be used for bonding. Prisms should have at least clearance to Pentaprism to release the danger of prism failure upon impact.

Wirings

Wirings should be unsoldered at the circuit board side's end.

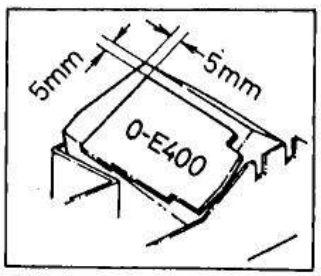


FIG 3-4
CIRCUIT BOARD(0-E400) INSTALLATION

[B] Repair

Inoperative Metering Needle

Ensure that f/stop coupling is made ; Preview lever is set at "Auto".

1 Power Circuit Check

a Camera body
See whether the battery output appears on the power coupler terminals, as shown in Fig3-5.

b Metering Switch
See whether S2 of F-VR is conducting.

c Mis-reading Avoidance Circuit (0-E300)

d Power Switch (S1)

e Metering Circuit Board (0-E400)

Power Coupler Terminals

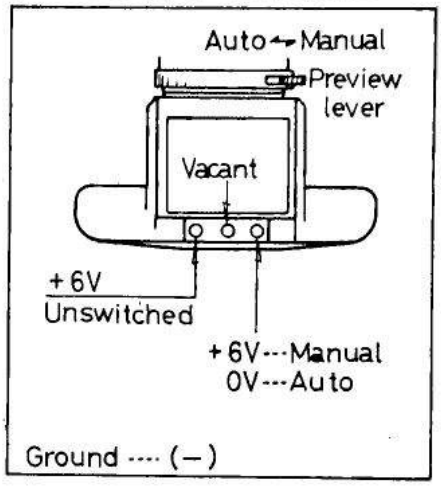


Fig3-5.

2 Ammeter Check
Ammeter needle reaches "zero-point" when about 90mV is applied, a 7mV-variation makes 1EV needle deflection.

3 Calculator Circuit Check
See the next.

Invisible Needle Regardless of EV

If the needle stays invisible regardless of metering operation as far as the power is "on", check the calculator circuit.

1 Wiring Check: between the circuit board and F-VR or T-VR.

2 Potential Check
(Use volt-meter with high input impedances, higher than 3MΩ)

The needle will show the "zero" when FET(Q2) gate receives around 0.3V. V_m will be found around 1V under usual brightness, say EV12. V_1 and V_2 checks may help to locate the cause.

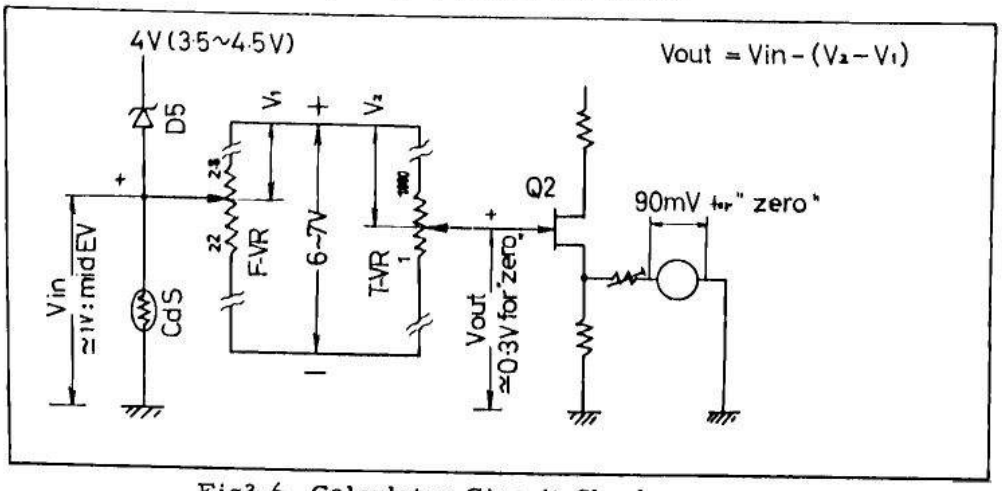
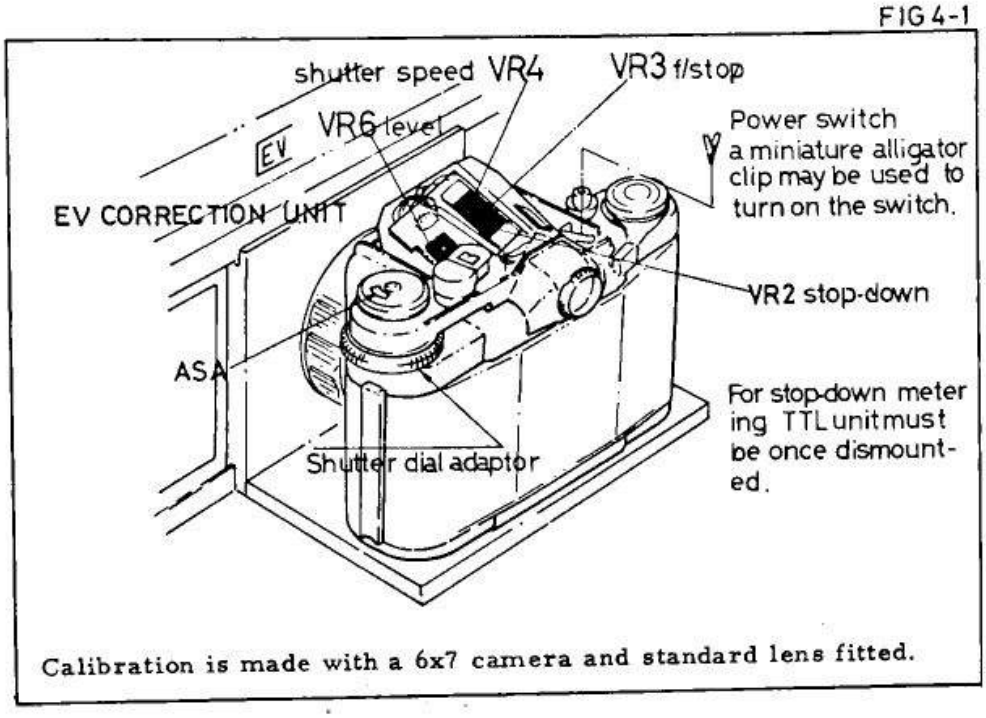


Fig3-6 Calculator Circuit Check

4. Metering Calibration

FIG 4-1



Calibration is made with a 6x7 camera and standard lens fitted.

FIG 4-2

CHECK POINT TABLE ASA 100

FULL-APERTURE METERING

EV	16	12	12	8	4
SHUTTER SPEED	1000	60	$\overline{500}$	4	$\overline{2}$
f/STOP	8	8	$\overline{2\cdot8}$	8	$\overline{2\cdot8}$

STOP-DOWN METERING

16	12	8	4
1000	60	4	$\overline{2}$
8	8	8	$\overline{2\cdot8}$

$\overline{\square}$: f/stop-error-imposed reading

Resistors to be adjusted:

Full-aperture metering

VR3	(Rheostat)	f/stop calculation adjustment
VR4	(〃)	Shutter speed and ASA 〃
VR6	(Dual rheostat)	Meter leveling , (also effective in stop-down metering's)

Stop-down metering

VR2	(Potentiometer)	Meter leveling

NOTE: Do not touch other VRs, since their re-settings will not be established by other than factory service.

CAUTION
Due to the circuit property, an adjustment will induce variations in the subsequent adjustments. The following steps should be carefully observed.

FULL-APERTURE METERING

Adjustment steps:

1 Ensure that f/stop coupling is properly made between the TTL unit and the camera;the preview lever is set at "Auto".
2 Turn on the power switch.
3 Check metering indications in the following sequence.

1	at EV16	with f/8	; 1/1000 sec.
2	EV8	f/8	; 1/4
3	EV12	f/2.8	; 1/500
4	EV4	f/2.8	; 1/2

a If readings are evenly high (+), } adjust VR6 to recover a correct
b 〃 low (-), } metering level.
c 〃 scattered, perform the following steps.

---

4 Match the needle to the "zero"at EV16 with f/8 ;1/1000 sec. by adjusting VR6.

---

5 Check the reading at EV8 with f/8 ; 1/4.
a If it is high (+), increase VR4, and see Step 6.
b 〃 low (-), decrease 〃
c 〃 right on, skip to Step 7.
(First application should be so made to a small extent as to find how it develops the result.)
6 Step4 and 5 should be repeated until an adequate adjustment has been made.

---

7 Check at EV12 and EV4 with f/2.8;1/500 and f/2.8 ;1/2 respectively.
a If the two readings are high (+), increase VR3, and see Step 8.
b 〃 low (-), decrease 〃
c 〃 right on, skip to Step 9.
(Adjustment can be made in the same manner as in Step 5. A small difference may exist between the two readings as an error)
8 Return to Step 4, and repeat Step 4 and Step 7, until an adequate adjustment has been made.

---

9 Establish a correct metering level by adjusting VR 6.
10 Check at each check point shown in Table, Fig4-2 .

STOP-DOWN METERING

Adjustment steps:

1 Ensure that f/stop coupling is disengaged ; the preview lever is set at "Man ".
2 Perform only after a full-aperture metering adjustment has been made.
3 Establish a correct metering level, by adjusting VR2, at the check points shown in Table, Fig4-2 .
(Small difference at each check point may exist within an allowable error)